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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/006,535	12/05/2001	Federico Carniel	CISCP735	1081

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EXAMINER

SOMMER, ANDREW R

ART UNIT	PAPER NUMBER
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3663

DATE MAILED: 01/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/006,535

Applicant(s)

CARNIEL ET AL.

Examiner

Andrew R Sommer

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 December 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3 and 4 are rejected under 35 U.S.C. 102(e) as being anticipated by Emori et al. (2002/0021864) (hereafter "Emori").

Regarding claim 1, Emori teaches an apparatus for amplifying an optical signal, said apparatus comprising: (1) a fiber (Fig. 17, 1); (2) a first group of N optical pump energy sources disposed to propagate optical energy into said fiber in a first direction (Fig. 17, 1350 nm pump light); (3) a second group of N+1 optical pump energy sources disposed to propagate optical energy into said fiber in a second direction opposite to said first direction (Fig. 17, 1450 nm and 1490 nm pump sources); and (4) wherein N is greater than or equal to 1, Raman amplification is induced in said fiber (see generally, Abstract), and said optical pump energy sources of said first group and said second group each have distinct pump wavelengths (1350 nm, 1450 nm, and 1490 nm, respectively).

Regarding claim 3, Emori teaches that the neighboring pump wavelengths of said distinct pump wavelengths are associated with optical pump energy sources that

propagate in opposite directions. Such is taught in, for example, Fig. 17, where in the 1350 nm wavelength and the 1450 nm wavelength, neighboring wavelengths, propagate in opposite directions.

Regarding claim 4, Emori teaches that said first direction comprises a direction of propagation comprises a direction of propagation of the optical signal through said fiber and said second direction comprises a direction opposite to said direction of propagation of said signal though the fiber. See generally, Fig. 17.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Emori.

Regarding claim 5, Emori does not teach that the second direction comprises a direction of propagation of said signal through said fiber and said first direction comprises a direction opposite to the direction of propagation of said signal through said fiber. In fact, Emori teaches that said first direction comprises a direction of propagation comprises a direction of propagation of the optical signal through said fiber and said second direction comprises a direction opposite to said direction of propagation of said signal though the fiber. See generally, Fig. 17. However, it would have been obvious at the time of the invention by Applicant to switch the forwards and backwards propagating

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pumping lights of the Emori reference so as to be propagating in opposite directions than that shown because such is merely the reordering of essential components, which would not result in any unexpected results. Additionally, it would have been obvious since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japikse*, 86 USPQ 70.

Claims 2 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Emori in view of Namiki et al. (IEEE J on Selected Topics in Quantum Electronics, 7:1, January/February 2001, pp. 3-16) (hereafter "Namiki").

Regarding claim 2, Emori does not teach that the pump wavelengths are selected to substantially flatten the amplification response of said fiber across a desired frequency band. The selection of pumping wavelengths for such a purpose is well known in the art. Namiki teaches that by implementing WDM pumping, a flat gain spectrum can be obtained. See generally page 6, section III. It would have been obvious to one of ordinary skill in the art at the time of invention by Applicant to modify the prior art of Emori to include additional wavelengths, each of which is selected so as to yield a composite flat gain profile, because as is well known in the telecommunications art, this type of a profile is desirous.

Regarding claim 7, Emori does not teach that the pumping lights should be depolarized. Such is well known in the art as it substantially eliminates problems associated with the polarization dependent gain of Raman amplifiers. Such is taught in

the Namiki reference at page 9 ("Use of depolarizer [sic] to a pump LD is an alternative way to diminish PDG in Raman amplifiers").

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Emori in view of Akasaka et al. ('288) (hereafter "Akasaka").

Regarding claim 6, Emori does not teach that the gain profile induced by the first group of optical pump wavelengths and a second gain profile induced by said second group of optical pump sources compensate each other to produce a substantially flat overall gain profile. Such is taught inherently in the Akasaka disclosure. Akasaka discloses pump sources such that that wavelengths of the first and second pumps are a first and a third wavelength, and the wavelengths of a third and fourth pumping source are a second and a fourth wavelength, respectively. Each of the first to fourth wavelengths are adjacent wavelengths. See column 14, line 65 to column 15, line 15.

This will inherently provide a compensating gain profile as the Raman shift is approximately 100 nm, and therefore the signal wavelengths which will receive maximum Raman amplification will also alternate in the same manner as the pumping wavelengths, and thus, the combined spectrum of the first and second pump sources (which have the first and third pumping wavelengths) and the third and fourth pumping sources (which have the second and fourth pumping wavelengths) will offset one another to yield a "substantially flat" gain profile. It would have been obvious to one of ordinary skill in the art at the time of invention by Applicant to modify the Emori Raman

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amplifier to include a pump arrangement as taught in Akasaka because the gain profile will be substantially flatter and this is an advantageous result.

Claims 8-12, 14 and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akasaka in view of Emori.

Regarding claim 8, Akasaka teaches all of the limitations save for the fact that the first group of pump sources has N pumping sources and the second group contains $N+1$ pump sources. Such is well known in the art as is taught in the Emori reference. It would have been obvious to utilize the arrangement shown, for example, in Fig. 17 of the Emori reference to allow the lowest wavelength pump (which should be located at the front of the Raman amplifier) to pump the additional wavelengths, which allows for lower noise amplification with a larger bandwidth.

Regarding claim 9, see the discussion of claim 6, above, the discussion of which is hereby incorporated by reference in its entirety.

Regarding claims 10-11 and 16-17 see the discussions of claims 4 and 5, above, the discussion of which is hereby incorporated by reference in their entirety.

Regarding claims 12 and 18, see the discussion of claim 6, the discussion of which is hereby incorporated in its entirety.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akasaka in view of Emori as applied to claim 8 above, and further in view of Namiki.

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Regarding claim 13, see the discussion of claim 7, the discussion of which is hereby incorporated by reference in its entirety.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akasaka in view of Emori as applied to claim 14 above, and further in view of Namiki.

Regarding claim 15, see the discussion of claim 2, the discussion of which is hereby incorporated by reference in its entirety.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references teach flattening of the gain in a Raman amplifier system: Foursa et al. ('962); Hamoir (20020163712); and Wang et al. (20020149838). The following references teach forward and backwards pumping in Raman amplifiers: Cornwell, Jr. et al. ('383); Kidorf et al. ('464); Ackerman et al. ('963); and Grubb et al. ('922).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew R Sommer whose telephone number is (703) 605-4274. The examiner can normally be reached on M - F 7:00 - 3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Black can be reached on (703) 305-8233. The fax phone numbers

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for the organization where this application or proceeding is assigned are (703) 872-9326 for regular communications and (703) 872-9327 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1113.

ars *ARS*
January 16, 2003

Robert W. [Signature]
SUPERVISORY PATENT EXAMINER
GROUP 3663